UNITED STATES PATENT AND TRADEMARK OFFICE

APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
10/791,473	03/02/2004	Yukihito Furuhashi	17507	2100

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Please find below and/or attached an Office communication concerning this application or proceeding.

	Application No.	Applicant(s)
Office Action Summary	10/791,473	FURUHASHI ET AL.
	Examiner	Art Unit	
	Akash Saxena	2128	

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE <u>3</u> MONTH(S) OR THIRTY (30) DAYS, WHICHEVER IS LONGER, FROM THE MAILING DATE OF THIS COMMUNICATION.
- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133).
  Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

1)☒ Responsive to communication(s) filed on <u>02 March 2004</u>.

2a)☐ This action is **FINAL**.   2b)☒ This action is non-final.

3)☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

4)☒ Claim(s) <u>1-11</u> is/are pending in the application.

    4a) Of the above claim(s) _____ is/are withdrawn from consideration.

5)☐ Claim(s) _____ is/are allowed.

6)☒ Claim(s) <u>1-11</u> is/are rejected.

7)☐ Claim(s) _____ is/are objected to.

8)☐ Claim(s) _____ are subject to restriction and/or election requirement.

Application Papers

9)☒ The specification is objected to by the Examiner.

10)☒ The drawing(s) filed on <u>02 March 2004</u> is/are: a)☒ accepted or b)☐ objected to by the Examiner.

    Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).

    Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).

11)☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

Priority under 35 U.S.C. § 119

12)☒ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).

    a)☒ All b)☐ Some * c)☐ None of:

      1.☒ Certified copies of the priority documents have been received.

      2.☐ Certified copies of the priority documents have been received in Application No. _____.

      3.☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

    * See the attached detailed Office action for a list of the certified copies not received.

Attachment(s)

1)☒ Notice of References Cited (PTO-892)

2)☐ Notice of Draftsperson's Patent Drawing Review (PTO-948)

3)☒ Information Disclosure Statement(s) (PTO-1449 or PTO/SB/08)
Paper No(s)/Mail Date <u>8/23/04</u>.

4)☐ Interview Summary (PTO-413)
Paper No(s)/Mail Date. _____ .

5)☐ Notice of Informal Patent Application (PTO-152)

6)☐ Other: _____.

DETAILED ACTION

1. Claims 1-11 have been presented for examination based on the application filed on 2nd March 2004.

Priority

2. Acknowledgment is made of applicant's claim for foreign priority under 35 U.S.C. 119(a)-(d). The certified copy has been filed in parent Application No. JP-2004-035917 and JP-2003-058313, filed on 2/13/2004 and 3/5/2003 respectively.

Specification

3. Applicant is reminded of the proper language and format for an abstract of the disclosure.

> The abstract should be in narrative form and generally limited to a single paragraph on a separate sheet within the range of 50 to 150 words. It is important that the abstract not exceed 150 words in length since the space provided for the abstract on the computer tape used by the printer is limited. The form and legal phraseology often used in patent claims, such as "means" and "said," should be avoided. The abstract should describe the disclosure sufficiently to assist readers in deciding whether there is a need for consulting the full patent text for details.
>
> The language should be clear and concise and should not repeat information given in the title. It should avoid using phrases which can be implied, such as, "The disclosure concerns," "The disclosure defined by this invention," "The disclosure describes," etc.

Abstract contains over 190 words. Amended abstract is required.

Claim Interpretation

Regarding Claim 1

The step of calculating similarity discloses:

> calculating the similarity between the <u>3D models to be retrieved</u> and the <u>3D model acting as the retrieval key</u> using the <u>acquired feature values about the sub-elements to be retrieved</u>, the <u>acquired data on information about the relationship between the sub-elements</u>, the <u>acquired feature values about the sub-elements of the retrieval key</u>, and the <u>acquired data on information about the relationship between the sub-elements; and</u>

As best understood the search based on the 3D model and a sub element is a similarity search based on the sub-tree search when the model is divided into a tree or graph like structure.

Further definition of the term "feature value" is presented by applicant in specification (pg.11) as "a value that can be calculated by processing a 3D model arithmetically. For example, "feature value" includes the surface area, volume, vertex probability distribution, and surface texture/color distribution for 3D data...and moment histogram".

Regarding Claim 7-9

Claims 7-9 disclose the "form" of the sub-elements, which is understood as different orientation, translation, and/or positioning of the same sub-element with respect to the sub-element in the retrieval key such that similarity is not immediately evident.

Claim Rejections - 35 USC § 112

The following is a quotation of the second paragraph of 35 U.S.C. 112:

> The specification shall conclude with one or more claims particularly pointing out and distinctly claiming the subject matter which the applicant regards as his invention.

4. Claims 1, 10 and 11 provide for the use of "acquired feature value", but, since the claim does not set forth any steps involved in the method/process, it is unclear what method/process applicant is intending to encompass. A claim is indefinite where it merely recites a use without any active, positive steps delimiting how this use is actually practiced.

Claims 1, 10 and 11 are rejected under **35 U.S.C. 101** because the claimed recitation of a use, without setting forth any steps *specifying how these feature values are used to calculate the similarity*, involved in the process, results in an improper definition of a process, i.e., results in a claim which is not a proper process claim under 35 U.S.C. 101. See for example *Ex parte Dunki*, 153 USPQ 678 (Bd.App. 1967) and *Clinical Products, Ltd.* v. *Brenner*, 255 F. Supp. 131, 149 USPQ 475 (D.D.C. 1966). [MPEP 2173.05(q): Use Claims]

Claim Rejections - 35 USC § 101

35 U.S.C. 101 reads as follows:

> Whoever invents or discovers any new and useful process, machine, manufacture, or composition of matter, or any new and useful improvement thereof, may obtain a patent therefor, subject to the conditions and requirements of this title.

5. Claims 10 & 11 are rejected under 35 U.S.C. 101 because the claimed invention is directed to non-statutory subject matter.

Regarding Claim 10 & 11

Claims 10 & 11 recite system claims without any tangible means to embody the system. Appropriate tangible embodiment of the system claims is required. E.g. computer processor, storage and display.

Claim Rejections - 35 USC § 102

The following is a quotation of the appropriate paragraphs of 35 U.S.C. 102 that form

the basis for the rejections under this section made in this Office action:

A person shall be entitled to a patent unless –

(b) the invention was patented or described in a printed publication in this or a foreign country or in public use or on sale in this country, more than one year prior to the date of application for patent in the United States.

6. Claims 1-6, 10 & 11 are rejected under 35 U.S.C. 102(b) as being anticipated by

U.S. Patent Publication No.2002/0004710 A1 by Takaaki Murao (Murao hereafter).

Regarding Claim 1

Murao teaches 3D model retrieval method of retrieving a 3D model similar to the

specified 3D model from a plurality of 3D models stored as objects to be retrieved in

a database by using various feature values calculated from the selected 3D model,

the 3D model retrieval method comprising *(Murao: [0024][0121])*.

Murao teaches specifying at least one of the selected 3D model *(Murao: in [0026]*

– as analyzing 3D shape model; [0028]) and a sub-element, which is a part of the

selected 3D model *(Murao: [0028]-[0029] – sub-element as node; [0044] only part of*

the tree is needed to be matched) as a retrieval key *(Murao: [0040]-[0041])*.

Murao teaches acquiring the feature values *(Murao: [0029] – feature value as*

information concerning nodes) of the sub-elements included in the 3D model

specified as the retrieval key *(Murao: [0040] – node as sub-element having*

geometrical information [[0067]-[0069]) and data on information about the

relationship between the sub-elements *(Murao: in [0026] as neighbor graph*

generator creating associating nodes based on position and geometry adjacency).

Murao teaches acquiring the feature values of the sub-elements included in the

3D models stored as objects to be retrieved in the database and data on information

about the relationship between the sub-elements *(Murao: [0121][0130])*;

Murao teaches calculating the similarity between the 3D models to be retrieved

and the 3D model acting as the retrieval key *(Murao: [0040], [0042])*; using the

acquired feature values about the sub-elements to be retrieved *(Murao: [0040],*

[0041] – sub-element as the node), the acquired data on information about the

relationship between the sub-elements *(Murao: [0042] – tree structure made out of*

nodes), the acquired feature values about the sub-elements of the retrieval key, and

the acquired data on information about the relationship between the sub-elements

(Murao: [0040]-[0044]); and displaying the result of retrieval on the basis of the

calculated similarity *(Murao: [0167][0168])*.

Regarding Claim 2

Murao teaches sub-elements (Murao: as nodes in [0028][0029]) of the 3D model are

structured and information on the structuring is the data on the relationship (Murao:

[0027]-[0030] – structuring include node generation and neighbor tree generation;

[0040][0041]; Fig.14).

Regarding Claim 3

Murao teaches calculating the similarity is using the feature values (having node

data as well as of the sub-elements at each of the hierarchical levels structured

(Murao: [0093], Fig.15-17).

Regarding Claim 4

Murao teaches specifying as a retrieval key includes specifying each of the sub-elements at the lowest level among the selected sub-elements as a retrieval key as specifying the bounding tree node generator specifying each node (if restricted at lowest level) as the search key (Murao: [0128][0125]).

Regarding Claim 5

Murao teaches calculating the similarity includes calculating the similarity between the sub-elements at the lowest level specified as the retrieval keys and the 3D model to be retrieved as performing breath first search to create a bounding tree and then comparing nodes, even at lowest levels, against the structure retrieved from the database (Murao: [0134][0151], especially [0134][0147]-[0151]).

Regarding Claim 6

Murao teaches the 3D model has attribute information corresponding to the sub-elements (node in Murao), and the displaying the result of retrieval includes displaying attribute information corresponding to the sub-elements at the same time (Murao: [0069][0070]- node attribute information; [0168]-[0169] displaying the result of the retrieval based on each node).

Regarding Claim 10

System claim 10 discloses similar limitations as method claim 1 and is rejected for the same reasons as claim 1.

Regarding Claim 11

System claim 11 discloses similar limitations as method claim 1 and is rejected for

the same reasons as claim 1.

Claim Rejections - 35 USC § 103

The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all

obviousness rejections set forth in this Office action:

> (a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negatived by the manner in which the invention was made.

The factual inquiries set forth in *Graham* v. *John Deere Co.*, 383 U.S. 1, 148

USPQ 459 (1966), that are applied for establishing a background for determining

obviousness under 35 U.S.C. 103(a) are summarized as follows:

1.   Determining the scope and contents of the prior art.
2.   Ascertaining the differences between the prior art and the claims at issue.
3.   Resolving the level of ordinary skill in the pertinent art.
4.   Considering objective evidence present in the application indicating obviousness or nonobviousness.

This application currently names joint inventors. In considering patentability of the

claims under 35 U.S.C. 103(a), the examiner presumes that the subject matter of the

various claims was commonly owned at the time any inventions covered therein

were made absent any evidence to the contrary. Applicant is advised of the

obligation under 37 CFR 1.56 to point out the inventor and invention dates of each

claim that was not commonly owned at the time a later invention was made in order

for the examiner to consider the applicability of 35 U.S.C. 103(c) and potential 35

U.S.C. 102(e), (f) or (g) prior art under 35 U.S.C. 103(a).

7. **Claims 7-9 are rejected under 35 U.S.C. 103(a) as being unpatentable over U.S.**

    Patent Publication No.2002/0004710 A1 by Takaaki Murao (Murao hereafter), in

    view of ACM Article "Topology Matching for fully Automatic Similarity

    Estimation of 3D Shapes" by Masaki Hilaga et al (Hilaga hereafter) published

    August 2001.

Regarding Claim 7

Teachings of Murao are shown in parent claim 1. Murao teaches displaying results

of retrieval includes displaying the _sub-elements_ (Murao: [0168]-[0169]).

Murao does not explicitly teach displaying the result of retrieval includes

displaying the _sub-elements in different form_ according to the similarity of the sub-

elements of the 3D model determined by calculating the similarity.

Hilaga teaches displaying the result of retrieval includes displaying the _sub-_

elements in different form according to the similarity of the sub-elements of the 3D

model determined by calculating the similarity where form is understood as

"viewpoint model" as discussed in section 6 _(Hilaga: Pg.209 Section 6.1 specifically_

& Section 6 in general; Fig.12 Specifically).

It would have been obvious to one (e.g. a designer) of ordinary skill in the art at

the time the invention was made to apply the teachings of Hilaga to Murao to

perform similarity search based on the topological information (Murao: [0022];

Hilaga: Abstract Lines – topological matching). The motivation to combine would

have been that although Murao is performing topological search, Murao does not

address situations where there may be a perfect match between models with same

topological structure but different orientation (e.g. translation, rotation and meshing

simplification and scaling etc.); however Hilaga cures this deficiency in Murao which

is more common in real life scenarios, with his technique (See Hilaga Section 6.1;

Fig.12) making the model similarity determination yielding results that fit well with

human intuition (Hilaga: Abstract; Conclusion). Further, Hilaga and Murao are

analogous art concerned with similarity determination of 3D shapes (Hilaga: title-

abstract; Murao: title-abstract).

Regarding Claim 8

Hilaga teaches displaying the result of retrieval includes displaying a sub-element

whose similarity is the highest in different form from the other sub-elements (Hilaga:

Fig.14).

Regarding Claim 9

Hilaga teaches displaying the result of retrieval includes displaying a sub element of

the 3D model specified as the retrieval key in different form from the other sub

elements (Hilaga: Fig.14).

Conclusion

8. All claims are rejected.

9. The prior art made of record and not relied upon is considered pertinent to applicant's disclosure.

10. **Examiner's Note:** Examiner has cited particular columns and line numbers in the references applied to the claims above for the convenience of the applicant. Although the specified citations are representative of the teachings of the art and are applied to specific limitations within the individual claim, other passages and figures may apply as well. It is respectfully requested from the applicant in preparing responses, to fully consider the references in their entirety as potentially teaching all or part of the claimed invention, as well as the context of the passage as taught by the prior art or disclosed by the Examiner.

In the case of amending the claimed invention, Applicant is respectfully requested to indicate the portion(s) of the specification which dictate(s) the structure relied on for proper interpretation and also to verify and ascertain the metes and bounds of the claimed invention.

Communication

Any inquiry concerning this communication or earlier communications from the examiner should be directed to Akash Saxena whose telephone number is (571) 272-8351. The examiner can normally be reached on 9:30 - 6:00 PM M-F.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Kamini S. Shah can be reached on (571)272-2279. The fax phone number for the organization where this application or proceeding is assigned is 571-273-8300.

Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see http://pair-direct.uspto.gov. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free). If you would like assistance from a USPTO Customer Service Representative or access to the automated information system, call 800-786-9199 (IN USA OR CANADA) or 571-272-1000.

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